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EXCAVATIONS AT ALAMBARAI

GOVERNMENT OF TAMILNADU
DEPARTMENT OF ARCHAEOLOGY

EXCAVATIONS AT ALAMBARAI

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General Editor : Dr. D. Karthikeyan, IAS,

Authors : R. Sivanantham
J. Ranjith
S. Sreekumar

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Dr. D. KARTHIKEYAN, IAS,
Commissioner

Department of Archaeology
Tamil Valarchi Valaagam,
Halls Road, Egmore,
Chennai-600 008.
Date :

PREFACE

The Tamil Nadu State Department of Archaeology was started with aim of conservation and preservation of ancient monuments in Tamil Nadu and to conduct excavations at historical sites. With the motivation to bring out the cultural history of Tamil Nadu, it has identified and carried out excavation in various historical places. This department has so far excavated 37 sites and unearthed various artifacts.

In the year 2011 - 2012 this department carried out excavation at Alambarai in Kanchipuram District at a cost of Rs. 2.5 lakhs sanctioned by the Government of Tamil Nadu. Alambarai village is a part of the Idaikkazhinadu (present Kadappakkam). There are remnants of the ruined fort which was probably built by Muhammedans during 17th C.E. In 1750 it was under the control of French. Alambarai fort is a protected monument by Tamil Nadu State Department of Archaeology. The Systematic Excavation was conducted within the premise of dilapilated Fort. During excavation antiquities pertaining to 18th C.E. were recovered from the laid trenches.

I wish to thank the Government of Tamil Nadu for sanctioning a sum of Rs. 2.50 lakhs under Part-II scheme during 2011 - 2012

toward archaeological excavation at Alambarai and a sum of Rs. 1.00 lakh under part - II scheme during 2014 - 2015 for bringing out this report. I would like to thank Dr. R. Kannan, IAS, Additional Chief Secretary to Government of Tamilnadu, Thiru. C.P. Singh, IAS, (who was the then commissioner of Archaeology) for the efforts taken by them to get these project sanctioned. I also thank the Director General of Archaeological Survey of India for granting permission to carry out excavation.

I appreciate the sincere efforts taken by Thiru. R. Sivanantham (excavation Incharge) and Thiru. J. Ranjith who were directly involved in the excavations and also for their excellent work. The over all supervision was done by Dr. S. Vasanthi, Deputy Superintending Archaeologist. The contour survey was done by conservation officials Thiru. T. Thangavel, A.E.E., Thiru. N. Rajesh, J.E., Thiru. M. Arun, Sthapathy. The excavated Antiquities were scientifically cleaned by Mr. M.S. Ashokdeen, Chemist, The drawings of trenches and pottery drawings were prepared by Thiru J. Ranjith, Curator.

This holistic report was made only due to the keen interest shown by Thiru. R. Sivanantham, Thiru. J. Ranjith and Thiru. S. Sreekumar, Technical Assistant. D.T.P. work, wrapper and photographs was designed by Tmt. D. Sathiyavathy, compositor. I also wish to thank Dr. C. Manoharan, Associate Professor, Department of Physics, Annamalai University for bringing a report on Spectroscopic and Geomagnetic studies on Ancient Brick samples from Alambarai fort.

I hope this publication will be appreciated by the scholars in the field of archaeology and history.

D. KARTHIKEYAN
Commissioner

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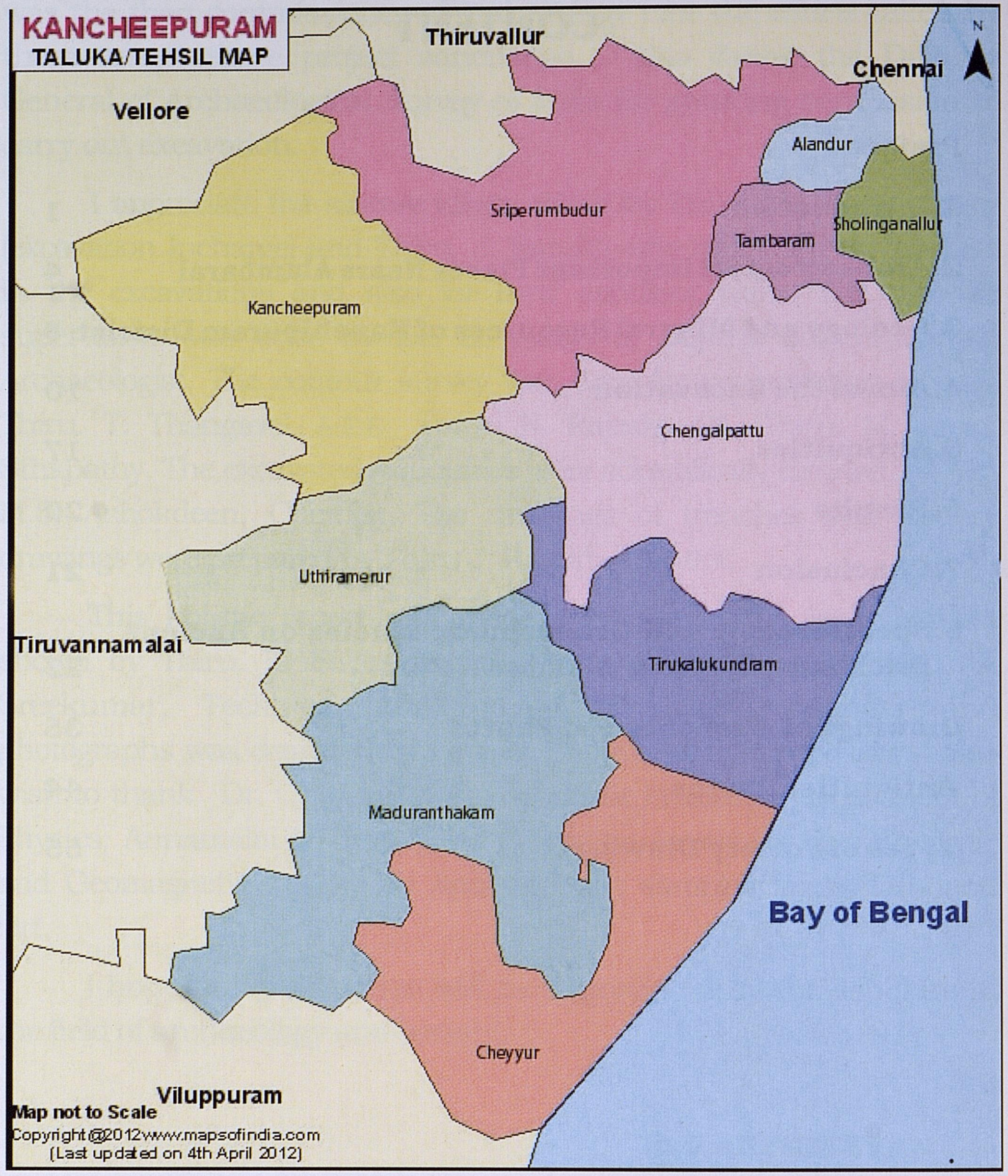

INTRODUCTION

Alambarai (Lat. 12° 16' 30'' N Long. 80° 1' 0'' E), a village on the sea shore is situated 120 km south of Chennai on the East Coast Road. This village has been mentioned as '*Alamparva*' and '*Alampuravi*' in the archival records[1]. This village part of the '*Idaikkazhinadu*' (also called Kadappakkam), Cheyyur Taluk of Kanchipuram District. There are remnants of ruined fort which was probably built by Muhammadans during 17th -18th CE. In 1750 it was under the control of French.[2] This fort is on the seashore of the Bay of Bengal. Alambarai fort is a protected monument by Tamilnadu State Department of Archaeology.

In ancient days, the village was in the limits of Idaikkazhinadu. A poet of Sangam period (3rd B.C.E – 3rd C.E) known as Idaikkazhinattu Nallur Nattattanar, author of Sirupanarruppadai hailed from this place[3]. Sirupanarruppadai vividly describes about this region, people and their activities and also the surrounding places up to Kidangil(modern Tindivanam) the capital of Nalliyakkodan, who was one of the chieftain of Tamilnadu in Sangam period. Ancient port Sopatnam (i.e. Marakkanam) is very close to Alambarai.

An inscription of the 9th regnal year of Rajaraja-I (994 C.E.) from Vedal[4] near Alambarai mentions Pallavan Idaikkazhinattukkon, the chieftain of this place. Rajadhiaraja-I inscriptions of the Vembanur[5] also mentions Idaikkazhinadu. The present Kadappakkam village was called as Idaikkazhinadu in sangam period. Hence, this place has continuous historic background from Sanagam period.

The Mohammadans built the fort on the seashore of Alambarai Village. In the eastern side, adjacent to this fort a dockyard was also built to load and unload the merchandise. The Fort is rectangular in shape (223mts. X 163 mts.) and built with bricks and lime mortar.

Dost Alikhan the Nawab of Carnatic who ruled Alambarai from 1736 to 1790 was the contemporary of French Governor Dupleix at Pondicherry. It is ascertained from the Ananda Ranagam Pillai Diary that there was a flourished port for the trade and political contact between rulers of Alambarai and Pondicherry. Ananda Ranagam Pillai was the Dubash (translator) of French Governor Dupliex.

Dost Alikhan the Nawab of Carnatic granted permission to the French Governor Dupleix to mint the coins of Rupees and he sent this permission from Alambarai fort to Pondicherry fort in 1736. To obtain this order the French people spent 1,20,000 Rupees. There were mints both at Alambarai and Pondicherry and they issued legal tender. The issue of legal tender from Alambarai fort is known as 'Alambarai kasu' or 'Alambarai Varahan'.[6] The value of one Alamabarai Varahan is equal to three rupees. A goldsmith known as Pottipattan from Alambarai was appointed as the chief of the mint at Pondicherry in 1736.

Imam Saheb, under Dost Alikhan sent 50,000 Varahans through Subbaiyar and Rangappachettigaru from Alambarai to Pondicherry fort. The governor further requested to bring 50,000 varahans from Alamabarai inexchange of 1, 00,000 silver Varahans. The Alamabarai Varahan was melted to find out its value and quality at Podicherry fort. Therefore, it is understood that there was mint in this place.[7]

The Alambarai had a fort with dockyard and from which salt was loaded to Podicherry and Portonova. The merchandise exported from the Alambarai port includes salt, ghee and cloths. The French carried their trade from this sea port.

The French Governor Dupleix supported Chanda Sahib, the son-in-law of Dost Alikhan and Musaffar Jung, the nephew of Nasirjung against the British. The Alambarai fort was passed into the hands of the French in 1750 as a gift from Musaffarjung to Dupleix. The British people invaded Podicherry in 1760; and the fort of Pondicherry fell into the hands of British and in the same year the Alambarai fort was reduced by Sir Eyre Coote. The village of Alambarai played the role of a sea port as well as fort in this region.

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5. Vasanthi, S., (Gen. Ed.)and Sivanantham, R. (Editor) "Tamilnattuk Kalvettukal -Vol. IV," TNSDA, Chennai. 2013. p.99.
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ARCHAEOLOGICAL IMPORTANT PLACES NEAR ALAMBARAI

Vembanur

An unnoticed temple inscription was found in the Muttalamman temple of Vembanur (located at 1 km from Kadappakkam). This inscription mentions the gift of 90 sheep for one perpetual lamp to the god Jeyamalisvara in Idaikkazhinadu. From the inscription it is understood that village name was Idaikkazhinadu. From the sangam period till date the village is called as 'Idaikkazhinadu'. 7th – 8th C.E. Pallava period sculptures were found at Ponniamman temple situated near Vembanur mottu colony.

Alambarai Dharga site

In Dharga site, opposite to Alambarai fort, a fragmentary Tamil inscription of Chola King Vira Rajendra (11th century C.E) was found. It records the planting of flower trees in the *Tirunandavanam*(garden) of the Jeyamalisvara temple.

Nallur

Nallur Nattattanar, a native of Nallur village, (author of Siruppanarruppadai of Sangam literature 3rd B.C.E. - 3rd C.E.) which is located at 4 km west of the Alambarai village. Where in a 19th century inscription is noticed on the eastern wall of Vinayaka temple. Nallur is a subdivision of the Idaikkazhinadu in the early period. Recently, a memorial has been erected for Nallur Nattattanar in the Kadappakkam for his contribution to Sangam literature.

Kadappakkam (Idaikkazhinadu)

In the Kadappakam village, ancient temples namely Kasivisvanatha and Dhrupathiamman are located.

Vilampur

This village is situated at 3 km north of Alambarai. Near the Siva temple on the sea shore of this village number of early period potshards and valuable antiquities are found in the field. The Linga and Nandi noticed in this temple belongs to the Chola period.

Vayalur

Vayalur situated about 3 km away from Vasavasamudram. The village Vayalur is also of considerable antiquity. A historic inscription dated in the reign of the Pallava ruler Rajasimha in the 8th century B.C.E. It gives a long list of Pallava rulers beginning with the mythical ancestors of the Pallavas down to the reign of Rajasimha. Thus over fifty two rulers are listed probably in the orders of succession. The selection of the site Vayalur to mention the overseas rule is not without significance. Being situated at the mouth of the river Palar, providing a natural entreport, it should have played a vital role in the overseas contact of the Pallavas. The Pallava rulers had paid special attention to the regions on either side of the Palar mouth.

Vasavasamudram

The village Vasavasamudram should have formed part of Vayalur in ancient times; the present hamlet with its name Vasavasamudram should have come to existence in 15 - 16th centuries during Vijayanagar rule. It was the Vijayanagar rulers who established a number of settlements with the name

ending Samudram. In the Sangam age, the village was included in the Tondai-mandalam region. In the 10th century it was in Mondur nadu, a sub-division of Amurkottam. The village was renamed Jananathanallur after one of the titles of Rajaraja-I. Tamilnadu State department of Archaeology has conducted the excavation at Varavasamudram in the year 1970. The important finds consisted of two ring wells found close to each other as at Arikamedu; a brick lined trough with damage, a large number of terracotta ovens, and heaps of shell limes.

The most of the objects found at Vasavasamudram, are amphora, rouletted ware, double ring wells, bricklined trough with drains, conical vases, overs, beads etc., correspond exactly with those found at the Roman site of Arikamedu. The site seems to have served mainly as an industrial site was occupied for a very brief period of 75 years towards the 3rd, 4th C.C.E

Sadras

Sadras (Sadurangapatnam) has considerable historic significance, particulrarly in the later period, which lies 5 km to the north of Vasavasamudram. Sadras rose to prominence in the British Period, with the building of the fort at Sadras by the Dutch, But it is pertinent to note that the port set up by the Dutch at Sadras owed its selection to weaving industry that flourished there. Its history can be traced back to the 10th century C.E. In the Vishnu temple at Sadras, inscriptions dating back to the 10th Century, the reign of Parantaka Chola-I has been noticed.

Paramesvaramangalam

Paramesvaramangalam is a village situated about 20 km north of Kadappakkam. It lies on the southern bank of Palar river; on its opposite side is situated the village of Vayalur.

Paramesvara mangalam was foundation of either Rajasimha or his father Paramesvara-I in the last quarter of the 7th Century C.E. A Siva temple, is situated on the small hill in the Palar river. This temple belongs to Pallava period. This temple *adishthana* is of stone and the super structure is of modern bricks. There are two inscriptions on the two sides of a slab near Ganesa image outside the Kailasivanathar temple. One of these inscription is 16th regnal year of the Pallava King Nirupatungavarman it states that the construction of a shrine Ganapathi and its consecration of a shrine to Sailesvarar (Kailasanather) by a brahman lady. Who also makes a gift of paddy for lamps and worship (ARE 258/1512).

The temple of Senpakesvarar is situated in the Nattam village hamlet of Paramesvaramangalam. Paramesvara mangalam had the alternative name of Nigarilisola chaturvedi mangalam. It is surname of Rajaraj-I. The temple of Senpakesvarar seems to have been a temple rebuilt in the post Parantaka-I period. It is a *tritala* temple and its faces the east. Bhikshatanar, Ganapathi, Dakshinamurthi, Lingodhbhavar, Brahma, Durga and Harihara are in the temple *devakoshtams.* It is one of the few temples of the early Chola age still in fair state of preservation.

Marakkanam

Marakkanam is on the eastern sea - coast about 5 kms south of Kadappakkam. The periplus of the Erythrean sea, a guide book by an anonymous Alexandrion (Greek) merchant written about the I century C.E. the author mentions that on the east coast of South India, there were three market towns and harbours - Camara, Poduca and Sopatna. It has been accepted

that Camara, can be identified with Kaberis of Ptolemy *ie.* Kaverippattinam (Poompuhar) the ancient Chola capital of the Tamil sangam period and that Produca or Poduka of ptolemy may be identified with Puducherry. Sopatna, which may be equated with Eyrip-pattinam, the modern Marakkanam. There is a fine Siva temple in this village, dedicated to Bhumisvarar. From this temple inscriptions Marakkanam, was originally known as Manakkanam. This village is a flourishing salt producing centre. This temple in its present structure would be assignable to the period of Rajaraja - I. Tamil Nadu State Department of Archaeology has carried out the excavation in Manakkom at near the Bhumisvara temple.

Geology and Mineral Resources of Kanchipuram District

Geomorphologically most part of this district is Pediplain with residuse hills parallel to coast. A typical ridge and gentle valley topograprahy is seen from Chingleput (on the northern bank of Palar) upto the coast. The coastal tract is marked by beach barrier dunes and sand dunes (aeolian deposit). The rivers that are draining this district include Palar, Cheyyar, Kortalaiyar and Cooum.

Rocks of Archaean age the main group of rock formation found exposed in this district. In addition to this. Sedimentary rocks of Gondwana Super group and Cuddalore formation (Mio-Pliocene age) are also noticed in few places. The other formation encountered in this district includes Gravel & Shingle bed locally known as Kanjeevaram Gravels (Piocene to Lower Pleistocene age) and Laterite & Alluvium of Quaternary age.

The Archaean rocks are represented by Khondalite Group. Charnockite Group and Migmatite complex. However major part of the district is occupied by Charnockite rocks. The lower Gondwana sediments comprises boulder beds, dirty white to light green, grayish yellow fine sandstone, siltstore and Khaki green to greenish grey shales. This sedimentary formation is found exposed in the northeast and south of Palar river and overlies the Archaean rocks.

The rocks of Mio-Pliocene age termed as Cuddalore Formation are noticed along the coast overlying the Charnockite and consists of a pebbly bed below and coarse gravel sand and clay with reddish clayey sandstone above. Conjeevaram Gravel comprises pebbles, shingle and gravels of Quartzite and quartz conglomerate is encontered arround Kanchipuram. Besides this, patches of Lower Cretaceous Formation are also seen in the Sriperumbudur area. This formation consists of greyish white sandstone, light grey shales and yellow siltstone.

Mineral Wealth

Clay (white grey and buff coloured) associated with the shales and sandstone of Upper Gondwana Formation are reported from Kannantangal. South of Kunnan, Kuttarambakkam and Mambakkam. Grey & white sands and Glass sands are known to accur at Kokkilimedu. Vadapattanam and Muthukadu. Besides this, Ochre and Red oxide are noticded in the areas namely Mambakkam and Sirumangadu.

AIM OF THE EXCAVATION

The preliminary survey was conducted in and around Alambarai village for collecting antiquities and ascertaining potential archaeological sites. Exploration in the premise of Alambarai fort yielded valuable antiquities viz. copper slag, iron nail, iron slag, potteries namely coarse red ware and black ware. Besides this, few glass pieces and porcelain shards with designs were also collected. In the course of exploration in this area, interesting findings were brought to light which will be more valuable for the excavation and test the following hypotheses:

1. To know the socio-cultural conditions during the 17th - 18th century C.E.
2. To establish the existence of Mint
3. To expose the flourished trade in Alambarai

TRENCHES

ALB-I

The first trench ALB- I (Lat. 12° 15' 951" N Long. 80° 00' 625" E), lay on east side of the fort wall. The actual area of the trench taken up for digging was 4 m x 4 m, having 1meter baulk each on the western and eastern sides of the trench. The first layer is brown in colour, the loose in texture and mixed with potshards up to 20 cm. Eleven porcelain ware shards were unearthed in between 20 cm – 25 cm. The numbers of porcelain

wares are decorated in floral designs in blue colour. In the same depth few bone pieces and charcoal pieces were collected. The large number of potshards collected in similar depth, most of the potshards were coarse red ware. One neck portion of glass bottle was collected at 20 cm level. A large number of broken roof tiles (*naattu oodu*) deposited in all levels.

In the 25 cm level, red soil with brick bats, lime mortars and large number of roof tiles found up to 35 cm. Six broken glass pieces and few slag were collected. In the 35 cm depth level one broken glass bowl was found. A remarkable discover of one granite stone canon ball at 35 cm level in the north-west was collected. This canon ball is 6 cm. diameter. Forty two potshards were collected in the same depth. The brick structure was noticed with lime mortar as binding material. The structure was oriented in north –south direction; its breadth is 45 cm. The brick size 24 cm X 12 cm X 4 cm.

The soil was dark brown colour mixed with clay content. It was very compact. In this level brick bats, lime mortar, charcoal and potshards were found in the 25 cm to 35 cm level. Iron nails collected from depth 50 cm level. Glass bottle mouth, smoking pipe, copper slag, domestic animals bone pieces were found. And also potshards in course red ware and porcelain wares are collected in between 40 to 50 cm. A noteworthy find was one granite stone canon ball at 50 cm level of north-east corner. This circular canon ball is 7.5 cm diameter. Two hop scotches (children used them to play games) were collected from 65 cm level.

The soil is dark brown colour mixed with lime mortar up to 60 cm; above 60 cm colour is changed, it appeared to be mixed

with lime mortar. This type of soil continues in 85 cm level. After 85 cm the colour of soil, content and texture are fully changed. This soil condition continues up to 300 cm level. It seems to be sea shore soil. But few potshards, small size brick bats are noticed. Brick bats, lime mortar, charcoal, iron ore, iron objects (nail, hooks, and pieces) and furnace pieces are found in the 50 cm to 65 cm level. Glass bottle pieces, three numbers of clay smoking pipes, terracotta spout were collected from 65 cm depth level. Domestic animals bone pieces are found in 85 cm level. One hop scotch collected from 85 cm level. Number of potshards in course red ware unearthed in 50 cm to 300 cm level.

ALB- I- 2

In Western side of the ALB-I trench at a (Lat. 12° 15' 952" N Long. 80° 00' 623" E), brick structure occur, so there was a need to further extern the trench to western side. In this trench humus was removed up to 10 cm level. The soil colour is reddish. After 10 cm digging was started up to 30 cm in four equal digs. This soil content is of brick bats mixed with lime mortar. In this level, potshards and significant antiquities were are collected namely, two pieces of hopscotch, one broken spout, large number of porcelain wares and neck portion of glass bottle. At the same level, some of the domestic animals bones, rusted iron pieces were found.

ALB-I -3

The trench ALB-I was digged in two stages; ALB-I-1 and ALB-I- 2. A structure was occurring in the western side of ALB-I-1 trench, so extension of the trench towards western side was carried out; that trench was called ALB-I-2. Beyond 10 cm depth of digging on western side wall of the existing structure was

noticed. This structure wall size is 45 cm breath. Even after 30 cm depth the floor of the existing structure was continuing of 30 cm depth level. Few notable antiquities were collected in this trench. Compared with two trenches the large numbers of antiquities were collected in the eastern side of the ALB-I-1. So we extended the ALB- I-1 to the eastern side; this trench named as ALB-I-3 (Lat. 12° 15' 950" N Long. 80° 00' 628" E). This trench originated in a north-south direction and measured 4 m X 4 m, having one meter baulk each side. Quadrant method was applied to this trench. At first, this trench was divided into four equal boxes. They were named as A, B, C and D respectively to the NE, NW, SW and SE quadrants. Firstly, humus was removed from the trench. Then the porcelain wares, glass pieces, iron piece, domestic animal bone piece and broken bottle neck piece were collected in 25-30 cm depth level. In 30-35 cm depth level, porcelain wares, iron nails were found. Antiquities such as iron pieces, glass piece in green colour, porcelain wares, bone pieces slag and spout were collected in the 35-40 cm depth level. Number of bone pieces and potshards were collected throughout the same level.

The soil colour was yellowish, compressed in texture with brick bats, lime mortar and roofing tiles in 40 cm level. In the quadrant 'B' in the 40-45 cm depth level broken glass piece, glass piece (blue colour) and domestic animal teeth were collected. In the same depth level, in the quadrants 'C', bangle piece (green colour), iron nail and two hop scotches were found. Fascinating find, was one lead ball (it was used as a bullet) in the same quadrant and the same depth level; its diameter is 2 cm. Glass piece was found in the same depth of quadrant 'D'. Antiquities such as Iron pieces, charcoal pieces, domestic animal bone

pieces, porcelain wares, potshards were found in large numbers in the 45-50 cm depth level in the all quadrants. In the 50-55 depth level, charcoal, glass piece, iron objects, animal bones, porcelain wares and potshards were collected.

A large number of iron nails, copper slag, glass pieces, porcelain pieces (portion of the spoon), bone pieces and charcoal pieces were collected in the 55-60 cm depth level. Interestingly, one broken lead bullet (*thotta*), wastage of lead pieces were found in the similar depth level. Porcelain wares, potshards and bone pieces were collected regularly in the 60-65 cm depth level. Bangle piece, broken spout piece and *hukka* pipe piece (smoking pipe) were found in the same level. In the 65-70 cm level, Iron nails, porcelain wares and bone pieces were found.

The soil colour was brownish, compressed in texture with brick bats, lime mortar and roofing tiles. In the quadrant 'D' in the 65-70 cm depth level, the antiquities such as Iron nails, bone pieces, charcoal pieces and glass pieces were collected. In the 70-75 cm depth level, domestic animal teeth, few bones, shell, glass pieces and iron nails were found. Some iron nails, porcelain wares, charcoal pieces, glass piece were collected in the 75-80 cm depth level in the quadrant 'C'. A more number of potshards were collected in the depth level. Upto 100 cm level in all quadrant, iron nails, bone pieces, porcelain wares and charcoal pieces were found. A broken half portion of hopscotch and terracotta lamp were collected in the 80-85 cm depth level in the quadrant 'D'.

ALB-II

This trench was located (Lat. 12° 15' 967" N Long. 80° 00' 600" E), at the western side of the trench ALB-I. It was originated

in a north-south direction and measured 4 meters X 4 meters, having 1 meter baulk each side. It was laid here to know mint wastage pieces which are found in field survey. Quadrant method was applied to this trench. At first, this trench was divided into four equal boxes. They were named as A, B, C and D respectively to the NE, NW, SW and SE quadrants. In this trench humus was removed. The soil colour was yellowish, texture content fine particles with few brick bats and lime mortars.

Soil colour was yellowish, compact in texture and mixed with small brick bats. The large numbers of roofing tiles, potshards were found. The Antiquities such as porcelain wares, iron slag, furnace pieces, glass pieces, domestic animal bone pieces, were found in this level. Eastern side of the trench, we noticed bulk of shells deposited. In the 30 cm depth level furnace pieces were noticed in the quadrant A. The Antiquities such as porcelain wares, charcoal were found in 35-40 cm level in the same quadrant. A large quantity of copper slags were collected in the 43-45 cm depth level. At the same level an amazing huge size Crucible (in tamil *moosai*) was found. Hence, this site might be copper melting area. At the 60 cm level soil colour was changed; the soil colour was brown. Further digged upto 130 cm level, A large quantity of copper slag and iron slag, charcoal, furnace pieces, bone pieces and smaller quantities of porcelain pieces, iron nails, potshards were collected upto 130 cm level in quadrant A and D .

ALB-III

This third trench ALB-III(Lat. 12° 15' 959" N Long. 80° 00' 562" E), was near to western side of the fort wall, this place was

an ash deposited place close to western side of the fort wall. It was originated in a north-south direction and measured 4 X 4 meters, having one meter baulk each side. It was laid here to know ash deposited area. Quadrant method was applied to this trench. At first, this trench was divided into four equal boxes. They were named as A, B, C and D respectively to the NE, NW, SW and SE quadrants. In this trench humus was removed. This soil colour is dark grey, texture content brick bats, lime mortar and roof tiles. Huge quantity of broken terracotta storage container was deposited in all depth levels. It might be used for charcoal storage purpose. In the quadrant 'D' in the depth of 10 cm, the clay material smoking pipe and slag were collected. In the 15 cm depth level soil colour was changed in to dark black. Mass of charcoal mixed with soil; few charcoal pieces also collected from the same depth. In the same depth, numbers of potshards, porcelain ware were collected. In the quadrant 'B', a canon ball was found in 20 cm depth .

In 20 cm depth level; the soil colour was black, texture content, brick bats, roof tiles and huge quantity of broken terracotta storage container pieces. Antiquities such as Iron nail, small lead piece, domestic animal bone pieces, and broken hopscotch were collected from 20 cm level in the quadrant 'B'. Copper slag and charcoal are found in the 25 cm level in the quadrant 'B'. In 26 cm level in the quadrant 'A' iron piece found. Charcoal and iron piece collected from 30 cm depth level in the quadrant 'B'. Rusted iron pieces are found in the 30-35 cm depth. Antiquities such as Porcelain ware, bone pieces, iron hook, charcoal, copper pieces, slag, glass piece, and furnace pieces

were collected in the depth level 35-40 cm. Upto 50 cm level, the soil colour was dark black and grey colour, compressed in texture with brick bats, roofing tiles, huge quantity of broken terracotta storage container pieces. Interestingly we found one children terracotta play disc (this disc in circular shape, two small holes in centre; the game locally called as *pappara mittai vilaiyattu*) and small brass padlock. An iron hook collected in the 50 cm depth level. After 50 cm level the soil appeared loose. Excavation was carried out upto 120 cm. depth.

ANTIQUITIES

The Antiquities obtained from Alambarai excavation mostly consist of terracotta objects and objects made of copper, lead, iron and glass, etc. In addition to this, antiquities namely Granite Canon Balls, Lead Ball, Porcelain wares, Red ware (Coarse variety), Spindle Whorl, Spouts, Hop scotches, Terracotta lamp, Crucible, Smoking pipes, Bangle pieces, Copper slag and Iron slag, Iron Nails and Glass Bottles were also collected from all trenches.

Granite Canon Balls

In ALB-I-1 at a depth of 35 cm, 50 cm and in ALB-III 20 cm. three granite canon balls of the weight viz 1.13 kg, 559 gm, 316.5 gm and two broken canon balls were found. (Plate No. 3) These canon balls were sculpted by experience Mason. The making of the granite canon balls was that the stone would have been hand worked to small radius sections and then rubbed up with a stone block.

Lead Ball

Lead ball used for shooting was also found at ALB-I-3 at a depth of 40- 45 cm. which is in small spherical shape. Its diameter is 2 cm.(Plate No. 4)

Porcelain wares

Bottom portion and rim portion of porcelain wares were found. (Plate No. 7 & 8) Blue colour is the common colour observed in many collection. Porcelain ware were made out of China clay (Kaolin). Porcelain word has been derived from Italian word "Porcellana" (cowries shell). Ceramic materials were made by heating raw material to temperature between 1200°C to 1400°C.

Red ware (Coarse variety)

This red ware must have been commonly used for utility purpose like storage vessels and pots. Since, red wares appeared in all periods in huge quantity. (Plate No. 13)

SpindleWhorl

This is spherical shaped with a hole in the centre. The hole was made to fix the iron rod for spinning the cotton thread. In Tamil it is called as *"Thakkili"*. The unearthed broken spindle whorl was made by lime stone.

Spout

The excavations yielded three spouted knobs with different shapes. (Plate No. 15) These terracotta spouted knobs were separately made and fixed at the shoulder portion of the vessels. These knobs were found only in the coarse red ware

variety. The spouted vessels were widely used in ancient Tamil nadu.

Hop scotches

The Alambarai excavations have yielded twelve hop scotches. (Plate No. 11 & 12)This hopscotches are flat potshards grounded in all the sides to make it circular. The children used them to play games. Even now this game is very popular among the children of the villages and is called as *"Pandi Vilaiyattu"*

Terracotta lamp

In the trench ALB-I-3 at a depth of 80 cm, found a terracotta lamp is of 8 cm diameter without decoration and having plain facet. (Plate No. 14) This type of lamp is commonly used even today.

Crucible

Crucibles are small in size used for melting the metals like Iron, Copper and Glass for manufacturing of utensils.

Smoking pipes

More than ten smoking pipes were unearthed at Alambarai. (Plate No. 16) Smoking pipes were made of China clay (Kaolin). They are long cylindrical and provided with tiny longitudinal hole for smoking.

Bangle pieces

Bangle pieces made of glass were collected from the excavation.

Copper slag and Iron slag

Iron and copper slag were collected in exploration and also remarkable quantity of slag were collected from the excavation.

Iron Nails

Number of iron nail collected from the excavation were in various sizes and various shapes in large quantity. (Plate No. 9&10) These iron nails were used in wooden articles like door, window etc.

Broken Glass Bottles

During excavation large quantity of glass broken pieces, neck portion and bottom portions were brought to light. (Plate No.5 & 6) Hence these bottles found in pieces should have been used as a liquid container for storing wine.

RESULTS

Excavation was conducted within the premise of dilapidated Fort. And in the process three trenches were laid out and one trial trench in habitation site. Each trench was laid with an extent of 4X4 mts and named in short as ALB-I -1, ALB-I -2, ALB-I -3, ALB-II and ALB-III. With increasing depth soil was slightly hard. In each trenches natural soil was met at the depth of 1.50 – 1.60 mts. The excavation has exposed three stratigraphical layers.

During excavation antiquities pertaining to 18th C.E. were recovered from the laid trenches. The collection of unearthed antiquities include Coarse Red ware shards, Porcelain shards, Copper pieces, Iron nails and Pieces, lead ball and fragments, Granite cannon balls, Spindle Whorl, Spout, Hop scotches,

Smoking pipes, Terracotta lamp, Bangle pieces, Broken Glass Bottles and Amulet. In addition to this slag of Copper, Iron & glass, Crucibles and Coin mould were also collected.

Excavated antiquities like granite cannon balls, lead ball and broken bullet in silver indicate that this fort actively functioned during the war in 18th Century between French and British.

The occurrences of crucible, coin mould and slag (Iron, Copper & Glass) expose the flourished activity of coin making, smelting of metals and glass for manufacturing of utensils; the other objects for domestic purposes during the 17th -18th C.E.

CONCLUSION

The systematic excavation conducted in and around fort area of Alambarai have yield invaluable antiquities for understanding the social-cultural condition prevailed during 17th -18th C.E. The occurrences of crucible, coin mould and slag (Iron, Copper & glass) expose the flourished activity of coin making, smelting of metals and glass for manufacturing of utensils; the other objects for domestic purposes during the 17th -18th C.E.

SPECTROSCOPIC AND GEOMAGNETIC STUDIES ON ANCIENT BRICK SAMPLES FROM ALAMPARAI FORT

Dr. C. Manoharan,
Associate Professor,
Department of Physics,
Annamalai University,
Annamalainagar.

Introduction

Archaeology deals with the systematic study of the relics of the ancient past and throws light on the life and cultural development of people. The relics are remains, in general of buildings, burial places, implements, utensils and ornaments belonging to periods for which there are no written records. Excavation at an archaeological site may reveal the depth of civilization. The unearhed clayware, broken statues, ceramic sherds, corroded armour and weapons etc., give valuable information about the material environment in the ancient times. Archaeological artifacts throw ample light on the nature, culture and the development of the civilization of the people. In the last few decades, the field of archaeology has acquired new dimensions by the application and development of new techniques adopted from the physical, chemical, biological and earth sciences.

Through contextual analysis and reconstruction of artifacts, we can reach back through time to develop a critical understanding of how ancient people used craft and technology

to solve problems of survival and organization, and to make symbols or representations of what was important in their world, especially for its maintenance, longevity and beautification. This process is known as the study of material culture and cultural heritage. A pioneer of materials science and its use in understanding ancient objects, said that object speak; they certainly cannot distort, lie, or "spin" like a text can. In this quest to learn from objects, materials science has special philosophical and practical roles. The systematic scientific study of the archaeological artifacts reflects the technological development, their civilization and trade links between different countries during the past. Various scientific methods like sepectroscopic and geomagnetic methods are most widely used for the study of archaeological artifacts like potteries, bricks and tiles.

Spectroscopic studies

Various spectroscopic techniques are used for analyzing archaeological artifacts; Fourier Transform Infrared (FTIR) techniques have been with a view to find the lower limit of firing temperature, study the nature of the magnetic component, and their origin, from which the artifacts were made by the artisans.The FTIR technique has been extensively used by Maniatis et al. (1982) to determine the lower limit of firing temperature of archaeological materials from Island. Similar study has been carried out by Duraiswamy et al. (1991) and estabilished the firing temperature of the archaeological artifacts collected from Tamilnadu, India.

Geomagnetic studies

Archaeomagnetic techniques have provided to be the best methods for revealing geomagnetic field variations during the

historic past. Archaeomagnetism is mostly known for magnetic dating of burnt materials in an archaeological context. When any material containing magnetic grains is heated above some 700C, it loses any previous remanent magnetization. As it cools down, the magnetic grains acquire a direction of magnetization that is the same as that of the Earth's magnetic fiels at that time and an intensity of magnetization, acquired during cooling is called a thermoremanent magnetization (TRM) and has the remarkable property that most of it is reheated or chemically changed. Such materials therefore retain a record of the direction and intensity of the Earth's magnetic field from the time that the magnetization was originally acquired.

Ramaswamy and Duraiswamy (1990) studied archaeological artifacts from various places in Tamilnadu, India belonging to different periods, and a geomagnetic secular variation curve have been drawn from 400 BC to 2000 AD. by subjecting them to Thellier and Thellier method.

Thellier and Thellier method (1959)

Magnetic intensity measurements were carried out by using Molspin Spinner magnetometer available at Environmental magnetism laboratory, Centre for Earth Science Studies (CESS), Trivandrum, Kerala. All heating steps were conducted in a magnetic measurements thermal demagnetizer and simultaneous cooling steps are carried out by exposure to Earth's magnetic field in the laboratory condition.

The samples were marked in a direction parallel to the known field. The initial NRM of the samples was measured and

then the samples were heated to different temperatures in steps of 100°C. up 600°C and cooled in zero field coil for removing the secondary magnetization. Then in the second time the samples are heated to same above temperatures and cooled in the Earth's present magnetic field in the laboratory and the magnetic moment TRM acquired in the present field is measured. Then

$$\frac{NRM}{TRM} = \frac{B_{anc}}{B_{lab}}$$

From the above relation , the ancient geomagnetic field (B_{anc}) intensity is measured

$$B_{anc} = \frac{NRM}{TRM} B_{lab}(\mu T)$$

Results

The Alambarai Fort brick samples were subjected to spectroscopic and geomagnetic studies. In order to understand the mineralogy, lower limit of firing temperature, manufacture technology and dating (period of the brick). From the spectroscopic studies the brick samples were fired around 800°C during manufacturing. Major minerals like quartz, anorthite, albite and orthoclase and the minor quantity of iron oxides (hematite) were identified. Although the bricks used in the Fort of the investigated were fired at low temperatures and consisted of small pores, the structural systems remained without losing their integrity. This can be explained by the use of brick-lime plasters which prevents water penetration to building and also prevents evaporation through bricks.

Bricks used in the construction of the Fort are low dense and high porous materials. They were produced from raw

materials containing low amounts of Ca-poor clay and fired at low temperatures.

New bricks that will be used in the conservation works of Fort should be compatible with the existing bricks. They must be produced by using Ca-poor clays, traditional production techniques and heating at low temperatures (below 800° C).

The B_{anc} values obtained from Alambarai Fort brick samples by way of subjecting them to Thellier & Thellier is shown in Table 1.

Table 1 : Archaeointensity results of bricks from Alambarai Fort (ABF)

Sample	Thellier & Thellier Method	
	NRM/TRM	B_{anc}(μT)
ABF-1	1.0944	42.5
ABF-2	1.0933	42.4
ABF-3	1.1138	43.3
ABF-4	0.9664	36.9
ABF-5	1.0138	39.0
ABF-6	0.9345	40.7
ABF-7	0.9541	41.4
ABF-8	1.0239	44.4
ABF-9	1.0138	44.0
ABF-10	0.9176	39.8
ABF-11	0.9333	40.5
ABF-12	0.9375	40.7
ABF-13	0.9007	39.1
ABF-14	0.9307	40.4
		41.07±0.50

From the table it is seen that the B_{anc}values are found to be almost similar for all the samples. The mean B_{anc} value of 41.07±0.50 μT was obtained from 14 out of 20 samples. The other 6 samples yield inconsistent values and the same may be discareded for the final measurements. To date the brick samples, the B_{anc} value is fitted in the secular variation curve and it existed at two different periods 150 BC and 1700 AD. From the stratigraphy, cultural sequence and the archaeologist suggested that the brick samples may be dated back to 1700 AD - 1750 AD. from the above suggestion it is evident that Alambarai Fort brick samples are belonged to 1700 AD.

Refernces

1. Duraiswamy, D., Ramaswamy, K. and Venkatachalapathy, R. 1991. In: Preceeding of the 1st International Colloquium on Role of Chemistry in Archaeology, held at the Birla Institute of Science and Research, Hyderabad, India, 15-18th November.
2. Maniatis, Y., Katsanos, A, and Caskey, M.E., 1982. Technological Examination of low-fired Terracotta statues from Ayia Irini, Kea, Archaeometry, 24: 191-198.
3. Ramaswamy, K, and Duraiswamy, D., 1990. Archaeomagnetic studies on some archaeological sites in Taminadu, India. Phys. Earth Plonet, Inter., 60: 278-284.
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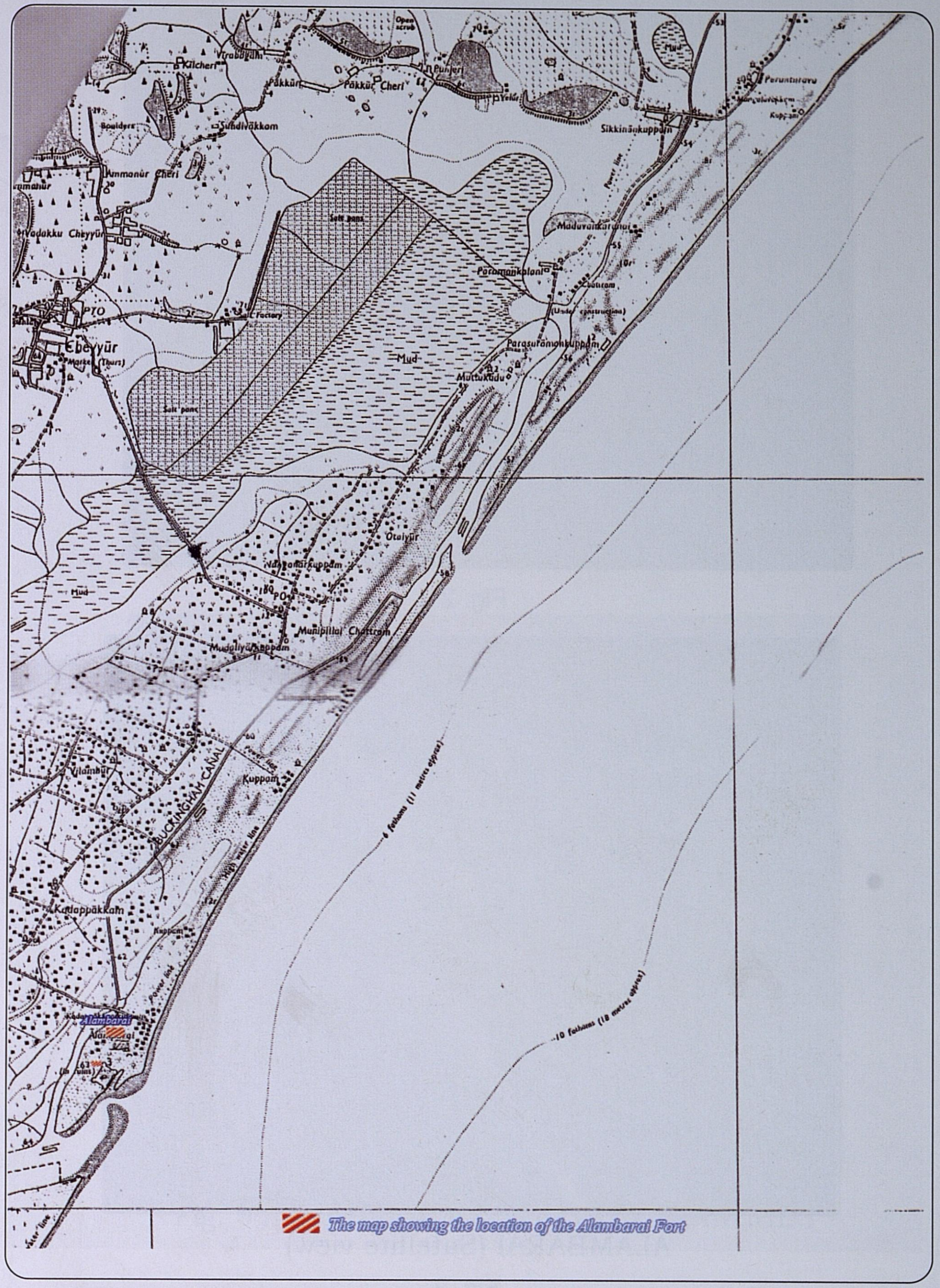
ALAMBARAI EXCAVATION
TRENCHE PHOTOS AND DRAWINGS



The map showing the location of the Alambarai Fort

Fig. 1

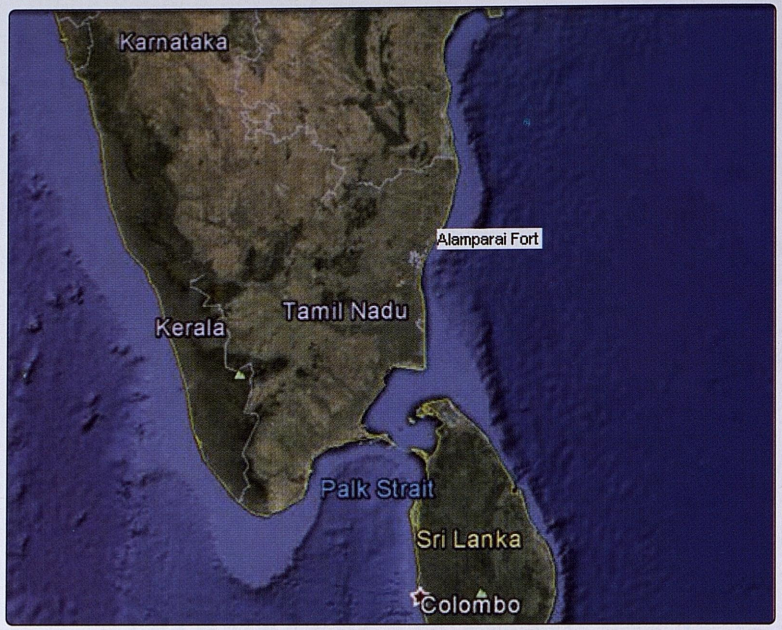


Fig. 2

ALAMBARAI (Satellite view)

Fig. 3

Courtesy : google

Fig. 4 ALAMBARAI FORT (Satellite view)

Fig. 5 ALAMBARAI EXCAVATION TRANCHES

Courtesy : Google

Fig.6. General view of Alambarai fort

Fig.7 General view of Excavated trenches ALB-I 2, ALB-I 1, ALB-I 3

Fig.8 ALB-I 1 Northern section

Fig.9 ALB-I 2

Fig.10 ALB-I 3 Eastern section

Fig.11 ALB-II

Fig.12 ALB-II Western section

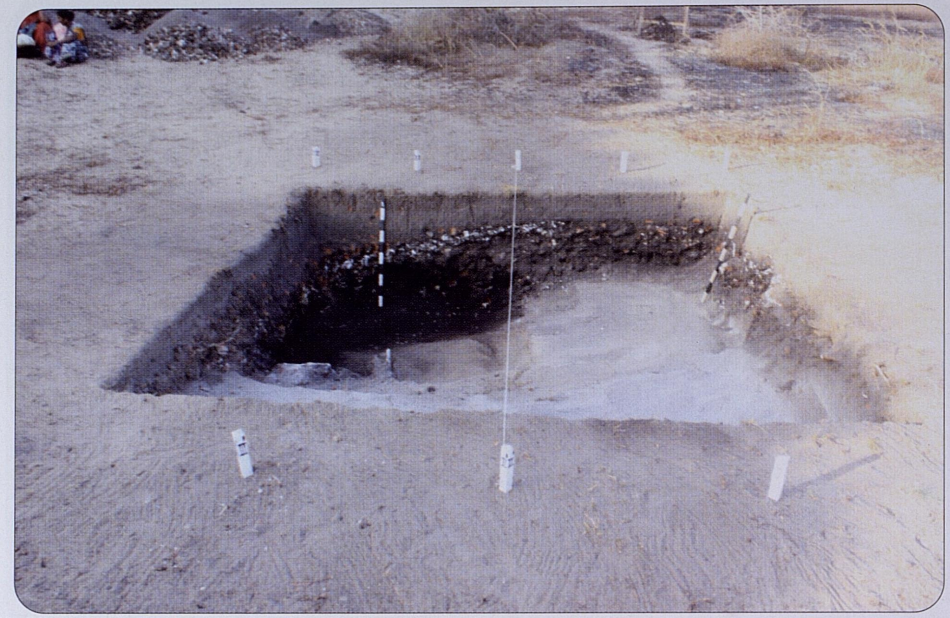


Fig.13 ALB-III Northern section

Fig.14 ALB-III Northern section

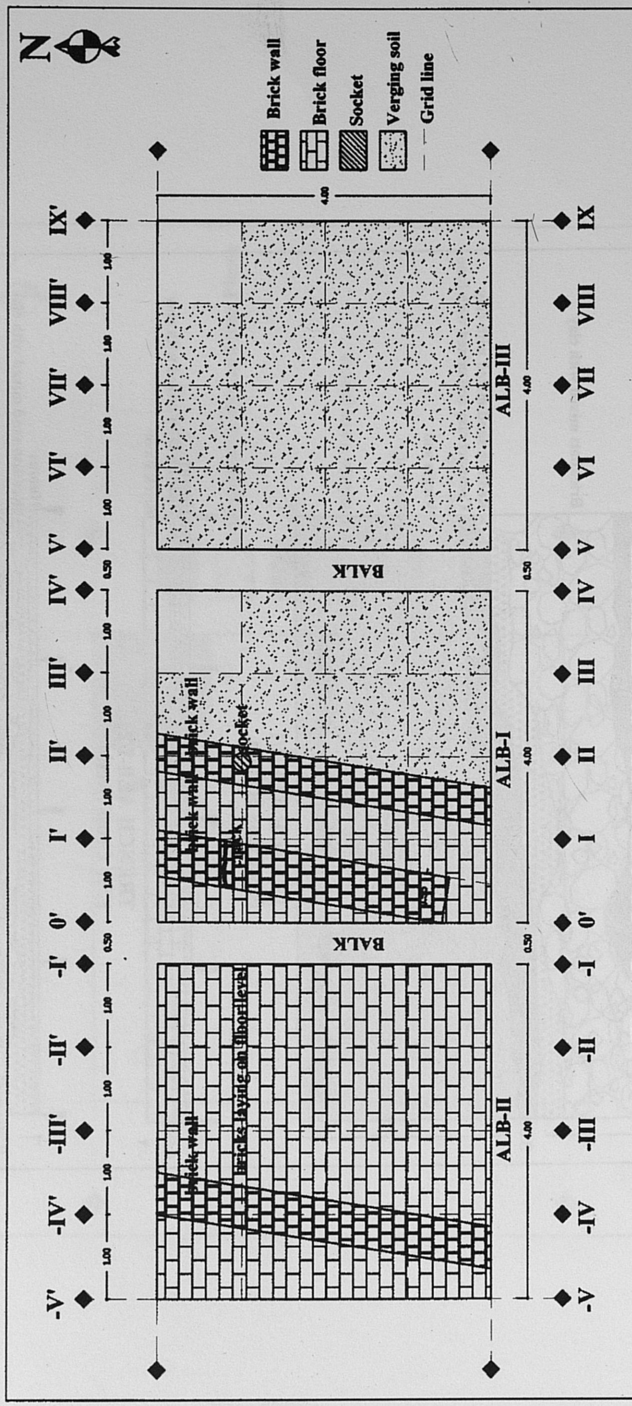
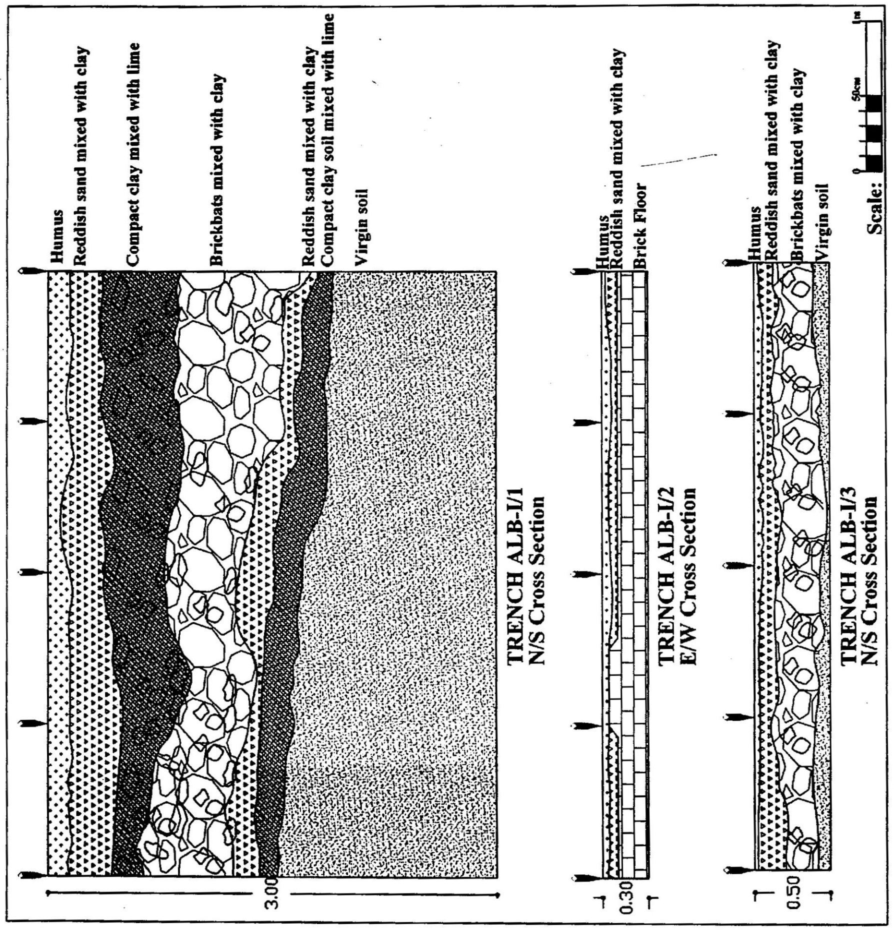
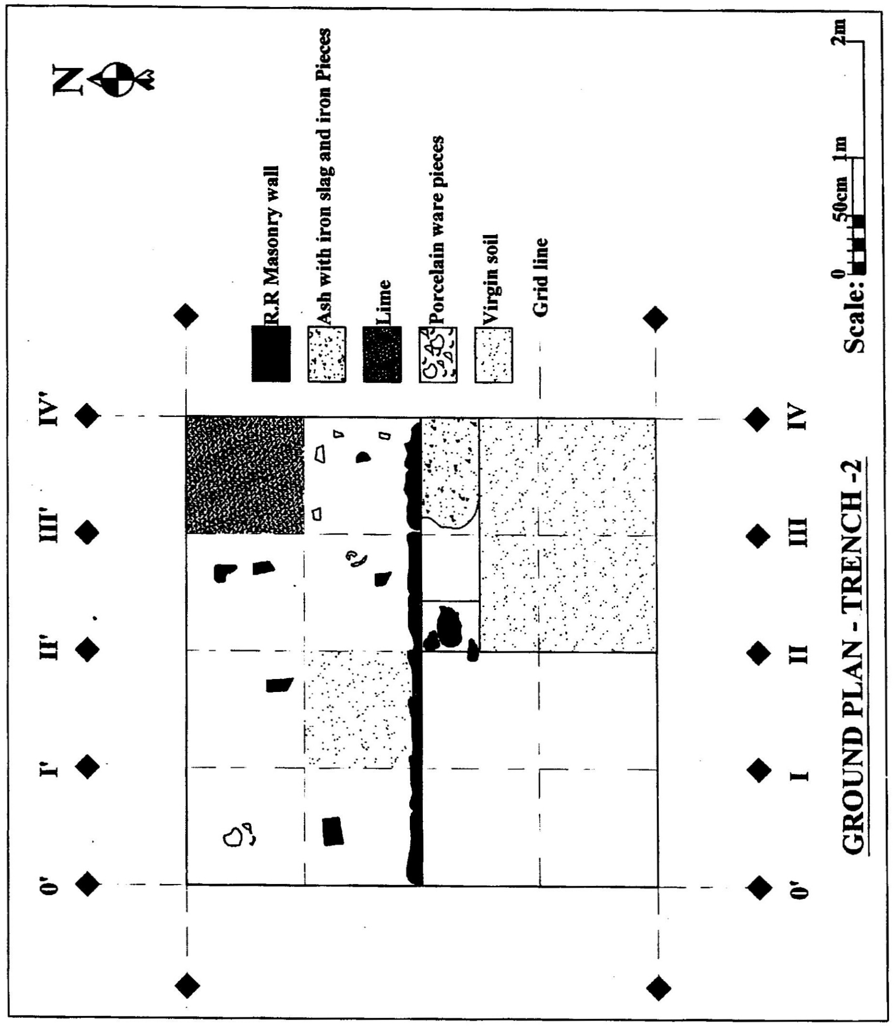


Fig.15 GROUND PLAN - TRENCH 1



Humus
Reddish sand mixed with clay
Compact clay mixed with lime
Brickbats mixed with clay
Reddish sand mixed with clay
Compact clay soil mixed with lime
Virgin soil
TRENCH ALB-I/1
N/S Cross Section
3.00
Humus
Reddish sand mixed with clay
Brick Floor
TRENCH ALB-I/2
E/W Cross Section
0.30
Humus
Reddish sand mixed with clay
Brickbats mixed with clay
Virgin soil
TRENCH ALB-I/3
N/S Cross Section
0.50
Scale:
0
50cm
1m

Fig.16



N
R.R Masonry wall
Ash with iron slag and iron Pieces
Lime
Porcelain ware pieces
Virgin soil
Grid line
0'
I'
II'
III'
IV'
0'
I
II
III
IV
GROUND PLAN - TRENCH -2
Scale:
0
50cm
1m
2m

Fig.17

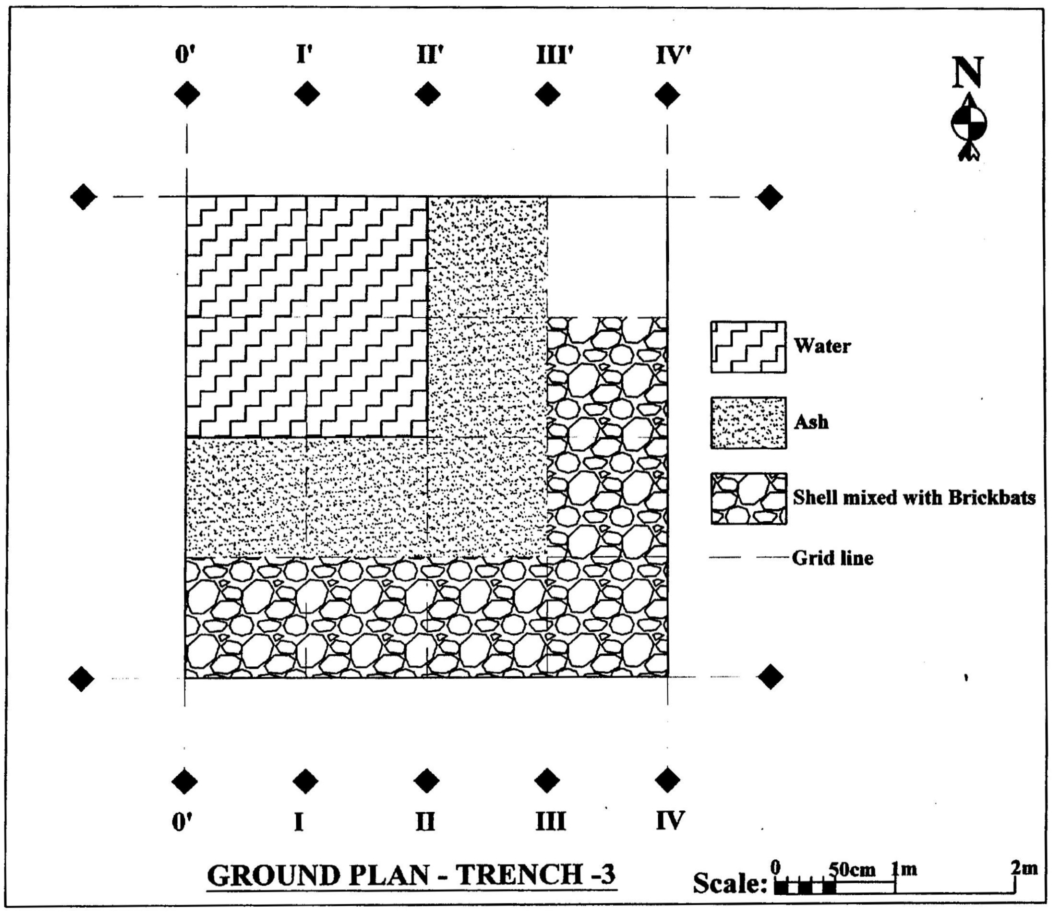


Fig.18

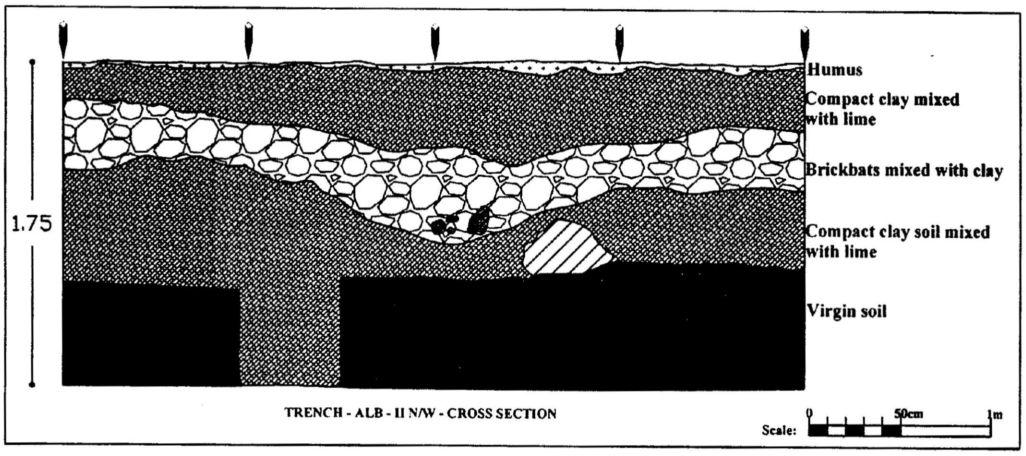


Fig.19

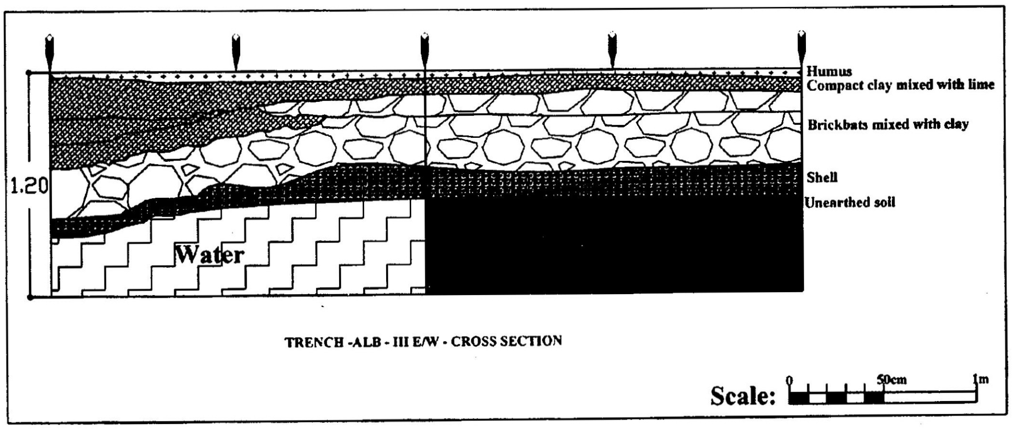


Fig.20

ALAMBARAI EXCAVATION
ANTIQUITIES

Plate No. 1 ALB-III - Bottle Knob

Plate No. 2 ALB-III Granite Cannon ball

Plate No. 3 Granite Cannon Balls

Plate No. 4 Lead Ball, Silver piece and Broken Bullet

Plate No. 5 & 6 Glass pieces

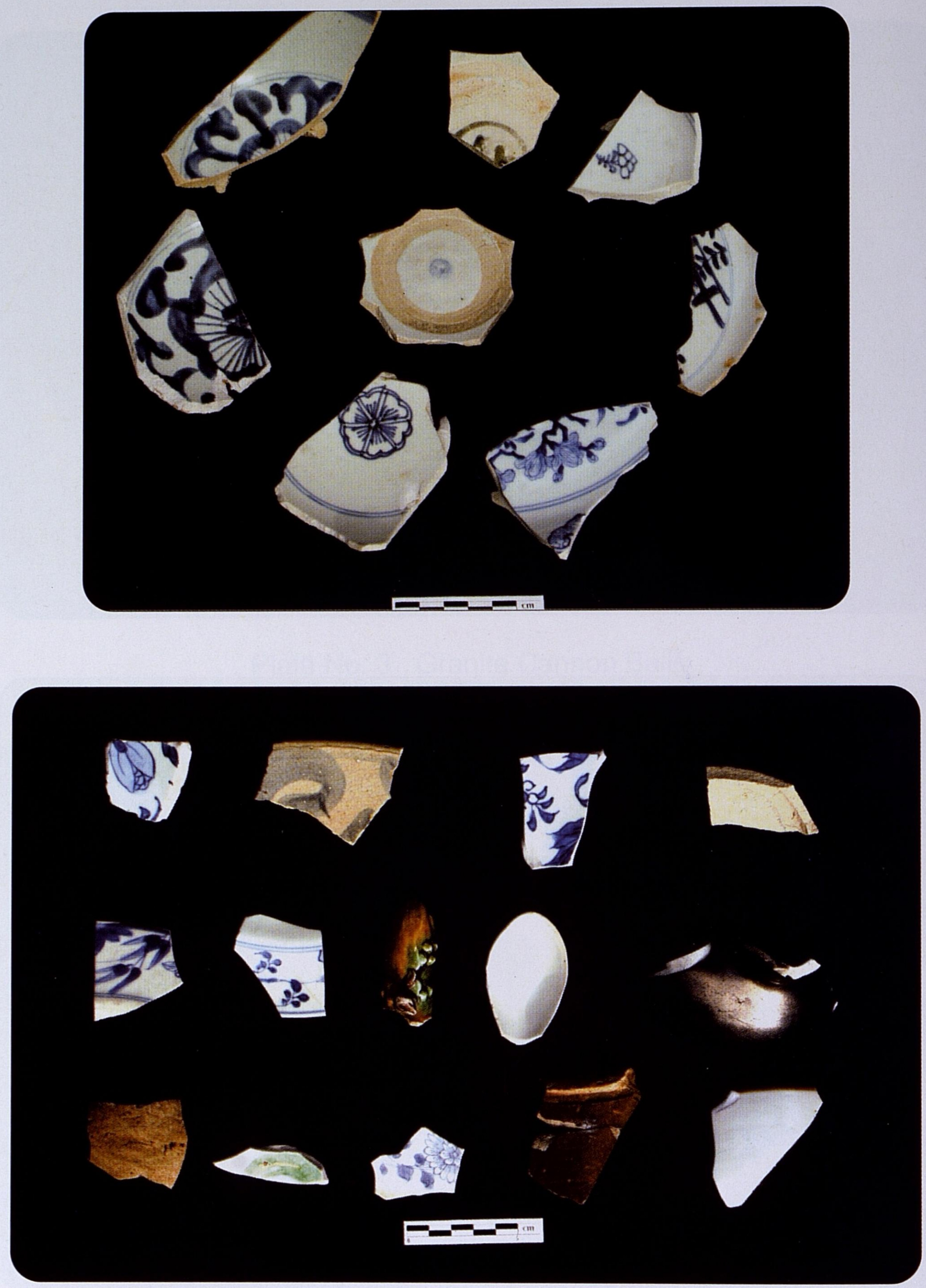


Plate No. 7& 8 Porcelain wares

Plate No. 9 Iron Nails

Plate No. 10 Iron hooks, ring and pieces

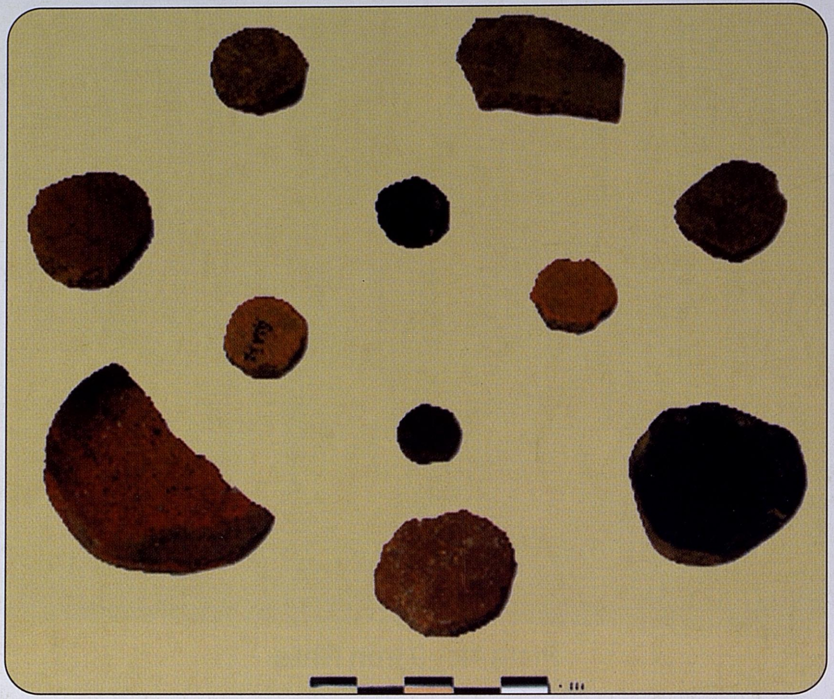


Plate No. 11 & 12 Hop scotches

Plate No. 13 Pot shreds

Plate No. 14 Terracotta lamp

Plate No. 15 Terracotta Spouted knobs

Plate No. 16 Smoking Pipes

Plate No. 17 Spindle Whorl and Amulets

Plate No. 17a Bangle pieces

Plate No. 18 Crucible

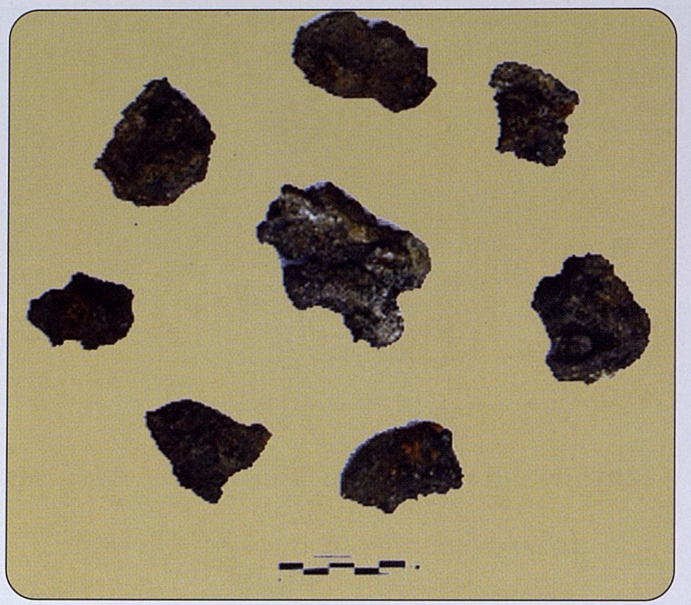
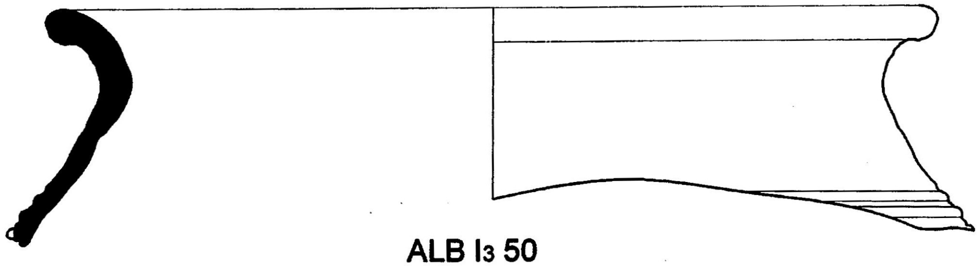


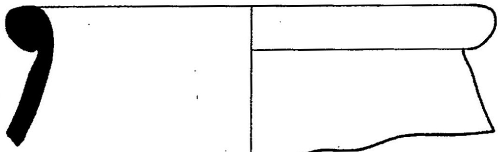
Plate No.19 Copper slag

Plate No. 20 Terracotta coin mould and pipe

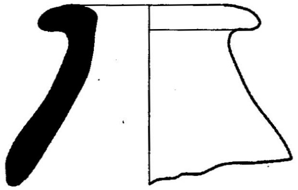
TYPES OF POTTERY DRAWINGS



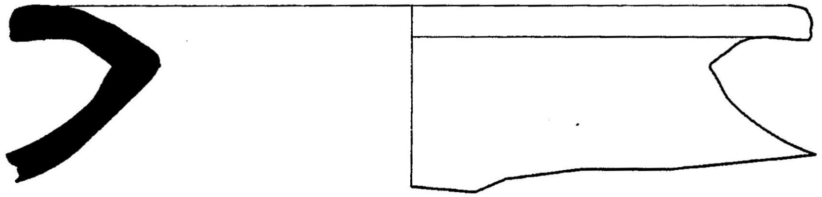
ALB I_3 50



ALB I_3 60



ALB I_3 70-75



ALB I_3 95

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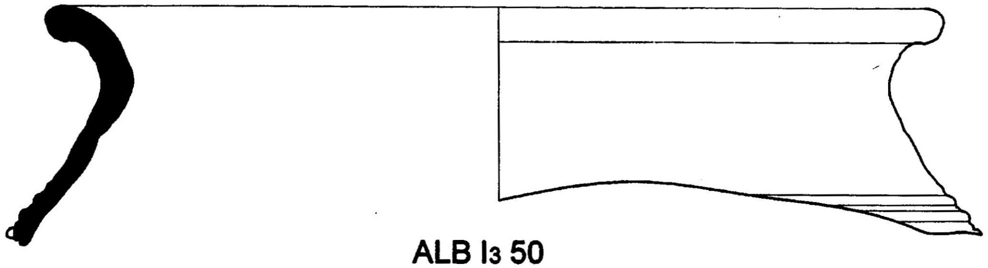

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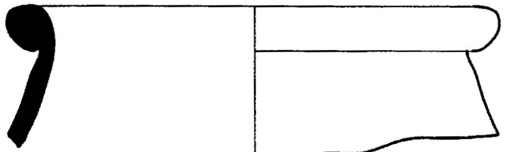

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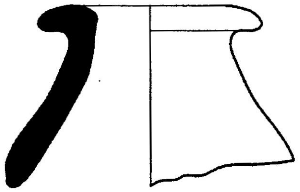

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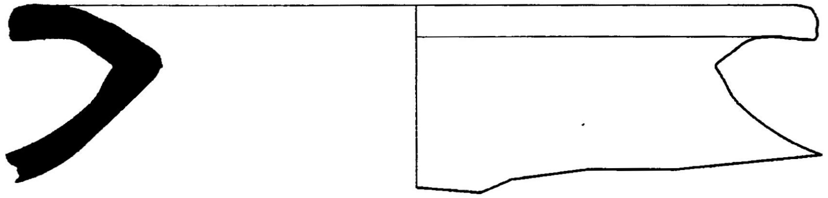

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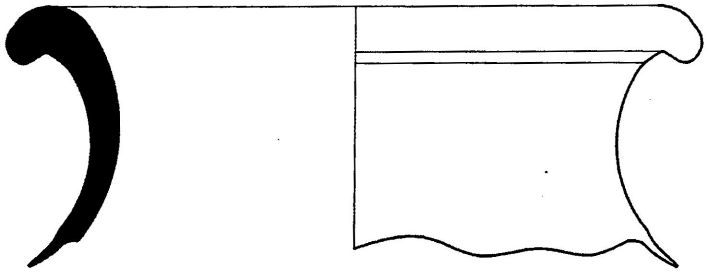

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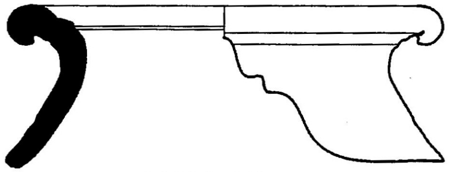

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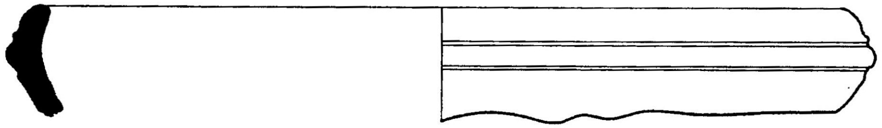
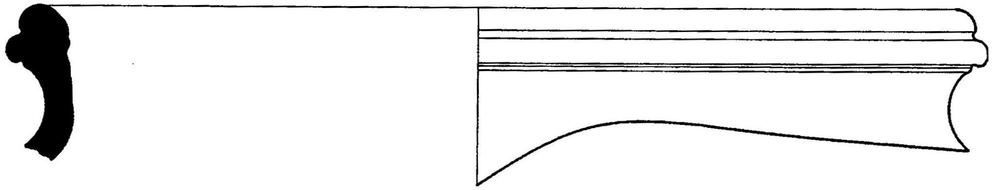


ALB I_3 75



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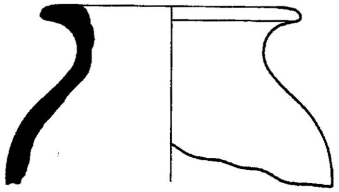
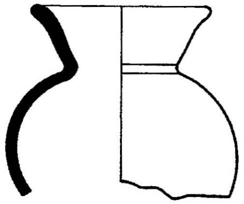


ALB I' 30



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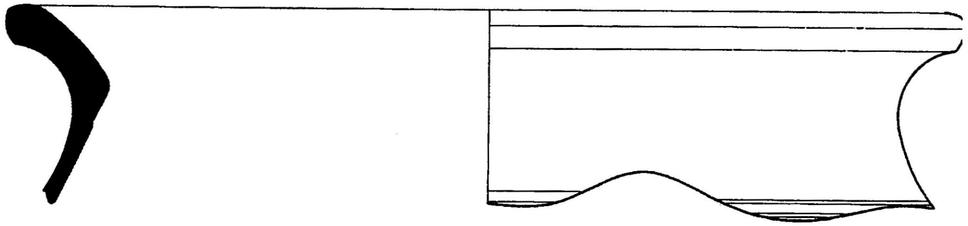

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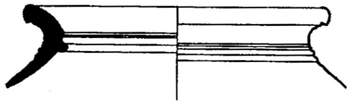
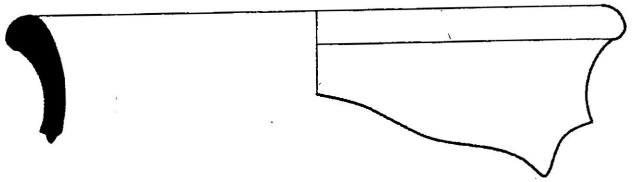


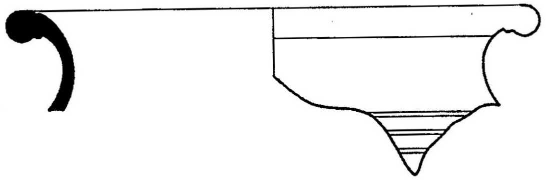
ALB I' 85

SCALE:



ALB III 100

ALB III B 45-55



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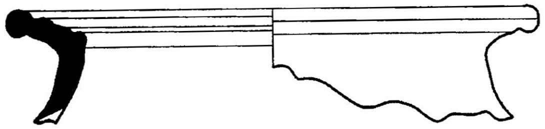

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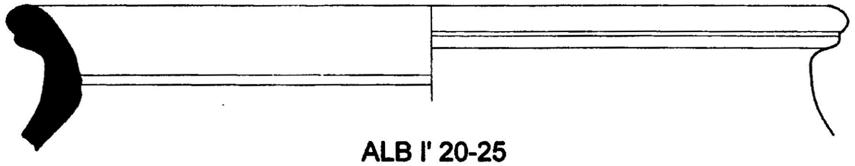
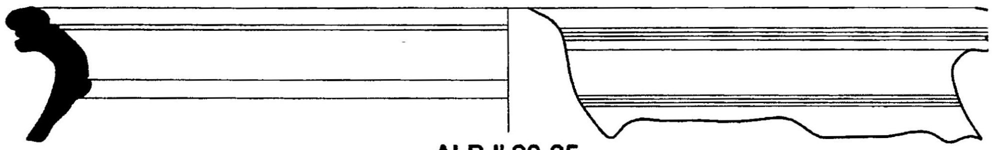
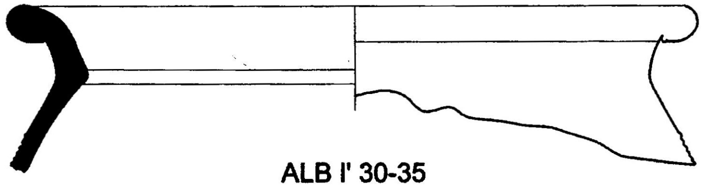


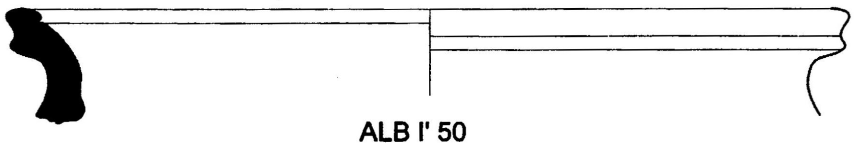
ALB I' 20-25



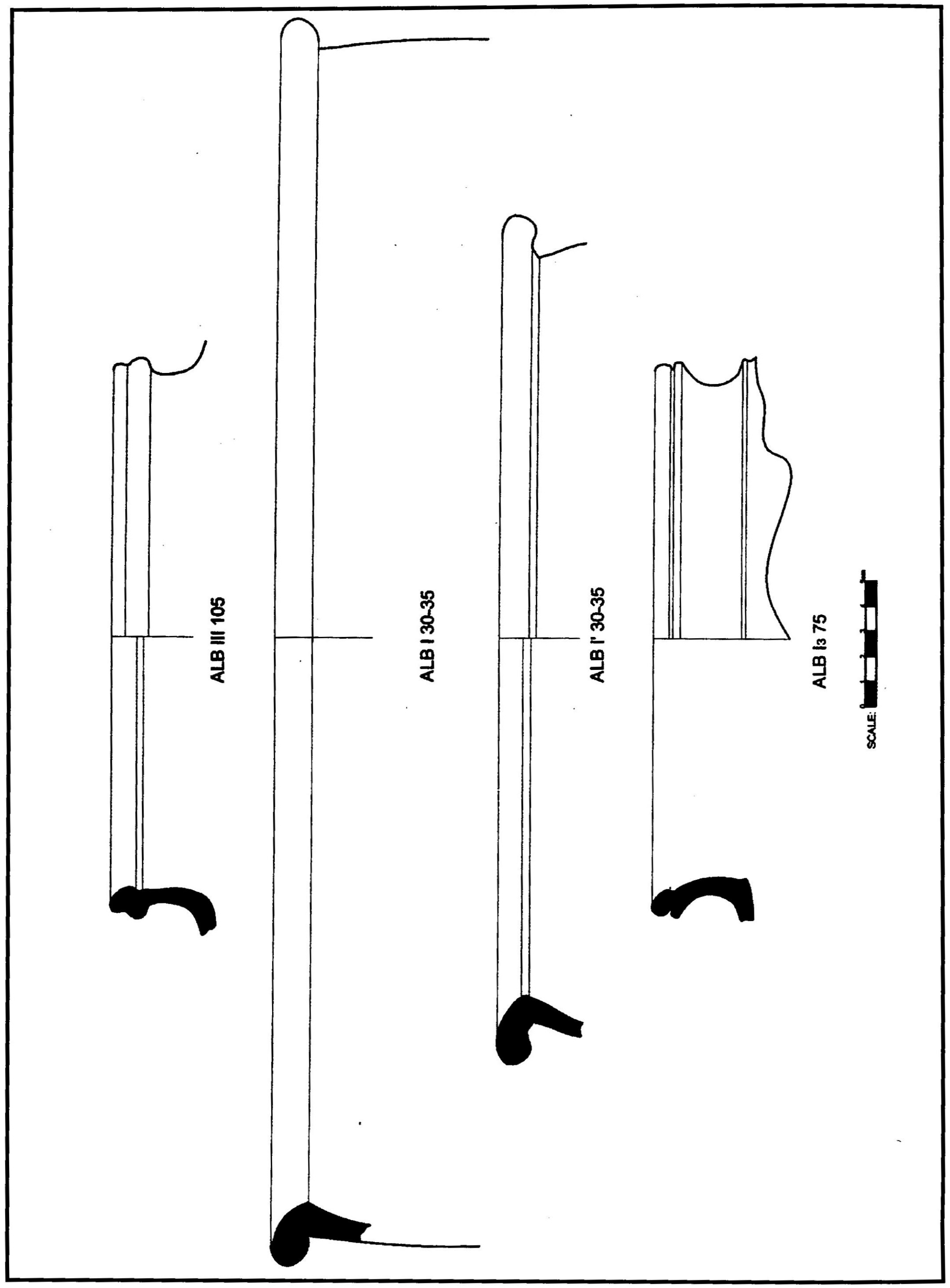
ALB I' 20-25

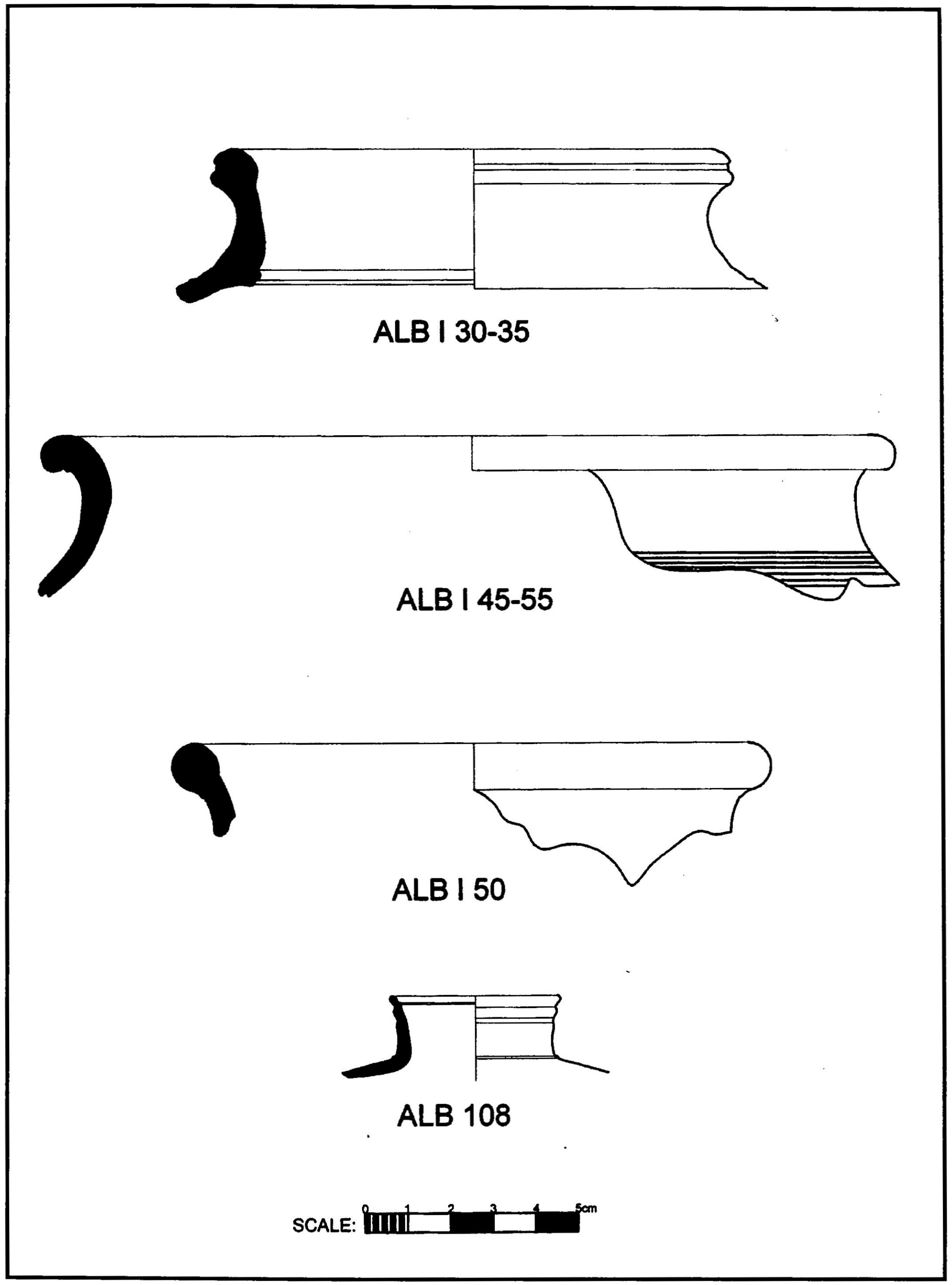


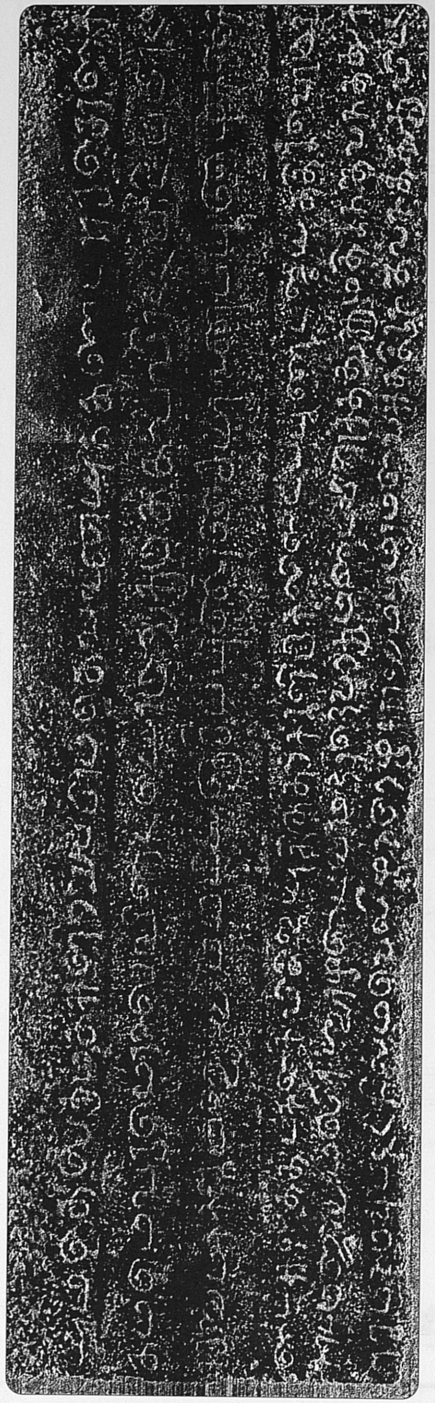
ALB I' 30-35



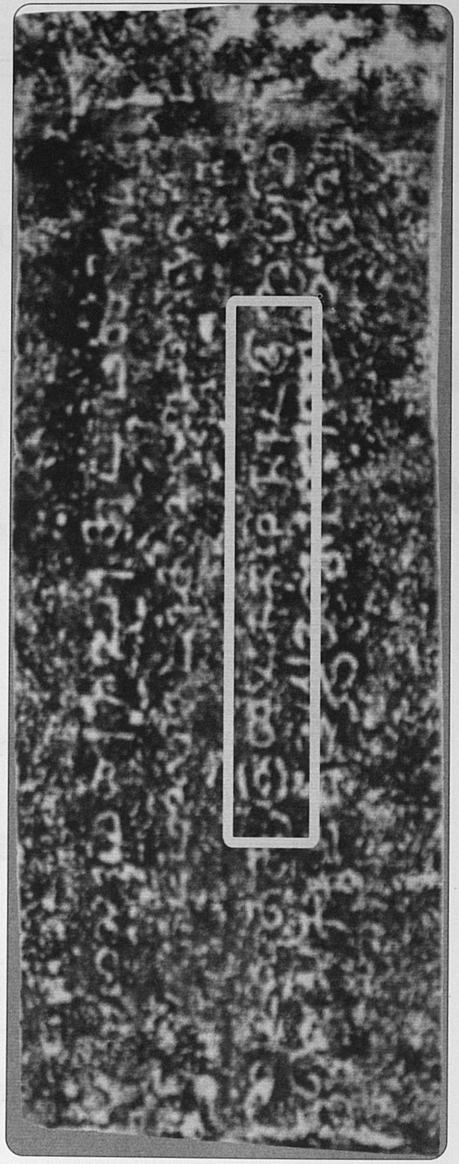
ALB I' 50


ALB III 105
ALB I 30-35
ALB I' 30-35
ALB I3 75
SCALE:


ALB I 30-35
ALB I 45-55
ALB I 50
ALB 108
SCALE: 0 1 2 3 4 5cm

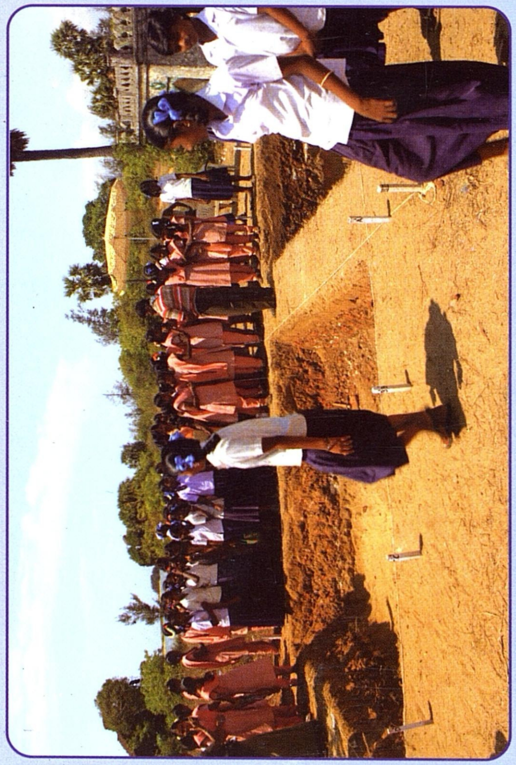
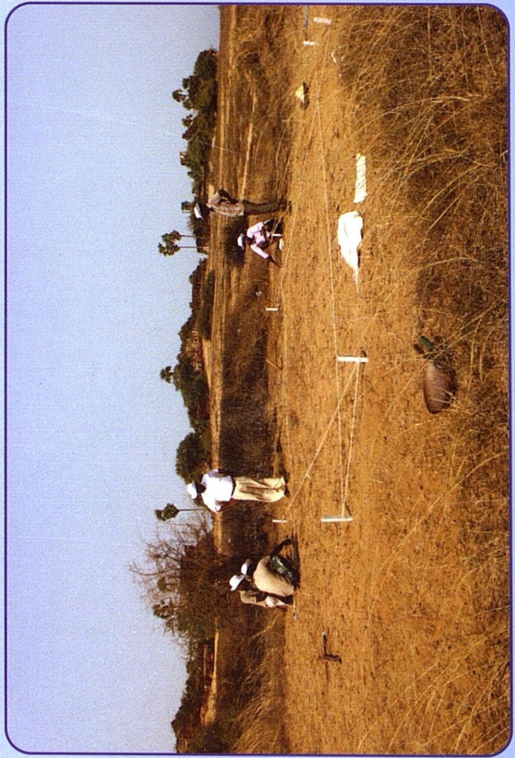


Alambarai Dharga site - Vira Rajendra Inscripstion. (p.4)



Vembanur Tamil Inscription. It refers 'Idaikkazhinadu' (p. 4)

A List of Archaeological Excavations Conducted by Tamilnadu State Department of Archaeology

S.No.	Place of Excavation	District	Year
01.	Korkai	Tuticorin	1968-1969
02.	Panchalankurichi	Tuticorin	1968-1969
03.	Vasavasamudram	Kanchipuram	1969-1970
04.	Anaimalai	Coimbatore	1969-1970
05.	Pallavamedu	Kanchipuram	1970-1971
06.	Karur	Karur	1973-1979 1994-1995
07.	Panayakulam	Dharmapuri	1979-1980
08.	Boluvampatti	Coimbatore	1979-1980 1980-1981
09.	Kovalanpottal	Madurai	1980-1981
10.	Thondi	Ramanathapuram	1980-1981
11.	Gangaikondacholapuram	Ariyalur	1980-1981 1986-1987 2008-2009
12.	Kannanur	Tiruchirapalli	1982-1983
13.	Kurumbanmedu	Thanjavur	1984-1985
14.	Palayarai	Thanjavur	1984-1985
15.	Alagankulam	Ramanthapuram	1986-1987 1990-1991 1992-1993 1994-1995 1996-1998

16.	Tirukkovilur	Villupuram	1992-1993
17.	Kodumanal	Erode	1992-1993 1996-1998
18.	Sendamangalam	Villupuram	1992-1993 1994-1995
19.	Padavedu	Tiruvannamalai	1992-1993
20.	Tiruttangal	Virudhunager	1994-1995
21.	Poompuhar	Nagappatinam	1994-1995 1997-1998
22.	Maligaimedu	Cuddalore	1999-2000
23.	Teriruveli	Ramanathapuram	1999-2000
24.	Mangudi	Tirunelveli	2001-2002
25.	Perur	Coimbatore	2001-2002
26.	Andipatti	Tiruvannamalai	2004-2005
27.	Modur	Dharmapuri	2004-2005
28.	Marakkanam	Villupuram	2005-2006
29.	Parikulam	Tiruvallur	2005-2006
30.	Nedunkur	Karur	2006-2007
31.	Mangulam	Madurai	2006-2007
32.	Sembiyankandiyur	Nagappatinam	2007-2008
33.	Tranquebar	Nagappatinam	2008-2009
34.	Rajakkalmangalam	Tirunelveli	2009-2010
35.	Talaichankadu	Nagappatinam	2010-2011
36.	Alambarai	Kanchipuram	2011-2012
37.	Srirangam	Tirchirapalli	2013-2014